
Diagnosis of Ovarian Cancer: Imaging Challenges in a Country with Limited Resources

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Abstract: Ovarian cancer is a public health problem in Burkina Faso. The objective of this study was to present the challenges of medical imaging in the diagnosis and monitoring of ovarian cancers in this context of countries with limited resources. This was a retrospective study carried out in the cancer department of the Yalgado Ouedraogo University Hospital in Ouagadougou. Patients in whom ovarian cancer was raised based on clinical, radiological and pathological arguments from January 2017 to December 2022 were included. The modalities, indications and results of the imaging examinations were analyzed. Fifty-two cases of ovarian cancer were identified. The medical imaging studies mentioned in the patients' files for the diagnosis and follow-up of ovarian tumours were CT scans (94.2%), ultrasound (57.7%), standard X-rays (42.3%) and MRI in eight cases. CT scans were performed as part of the preoperative work-up in 24 cases and postoperatively in 25 cases. The examination reports were not standardised; the writing style was free. The appearance of the lesion was mentioned in 14 cases (60.9%). No ultrasound report mentioned the use of the endovaginal route. The reports were not standardised; the writing style was free. The characteristics of the ovarian tumours were not mentioned in the ultrasound reports. Ovarian location was reported in 47% of cases and extension to other pelvic organs in 20%. Chest X-rays were prescribed in addition to abdomino-pelvic ultrasound or CT scans, when diagnosing or monitoring ovarian tumours. No preoperative laparoscopy was performed. The challenge of ovarian cancer imaging in a context of countries with limited resources lies in the efficient use of available imaging resources. Examination procedures and report writing should comply with good ovarian cancer imaging practice in order to optimise patient care.

Keywords: Ovarian Cancer, Computed Tomography, Laparoscopy, Ultrasound, Surgery

1. Introduction

Ovarian cancer is a public health problem. It is the 8th most common cancer in women worldwide and the 4th leading cause of cancer deaths in women. The age-standardized incidence rate was 6.6/100,000 women worldwide in 2020 [1]. There is still no validated method for mass screening of this cancer [2]. The onset symptomatology

is not specific. The discovery of this disease is therefore often late. Ovarian cancer has a poor prognosis. 5-year overall survival in developed countries is about 43% [3]. The prognosis depends on the initial stage of the disease, the histological type and also the quality of management.

The standard treatment is resection surgery with the objective of complete resection without residue, combined with chemotherapy [4]. If complete resection is impossible,

surgery should allow optimal resection of the lesion, often preceded by neoadjuvant chemotherapy. The role of imaging in ovarian tumours is to characterise the lesions, to help make a positive diagnosis using image-guided biopsies, to map the lesions before surgery, to carry out an exhaustive extension work-up in the event of malignancy and to assess the tumour response after chemotherapy [5]. The assessment of ovarian cancer extension is based on computed tomography (CT) and diagnostic laparoscopy. CT contributes to optimal treatment planning by looking for signs of non-resectability of the tumor. Magnetic resonance imaging (MRI) can be a useful complement to CT because of its better tissue contrast resolution [6].

In Burkina Faso, ovarian cancer is the fourth most common cancer in women with a standardized incidence rate at the age of 7.8/100,000 women in 2020 according to Globocan [1]. The prognosis of this disease is even worse, like other countries with limited resources, because of a lack of adequate resources for its management [7]. Universal health coverage is not yet effective for all, severely limiting access to care, particularly in oncology where treatment is expensive. While the availability of medical imaging resources has increased in recent years, cross-sectional imaging (CT and MRI) still remains of limited geographical and financial accessibility for some populations. Also, laparoscopic explorations remain the prerogative of rare health centers. The challenge in the diagnosis of this cancer is the efficient use of the few resources available for optimal management.

The objective of this study was to present the challenges of medical imaging in the diagnosis and monitoring of ovarian cancers in this context of countries with limited resources. This could contribute to the efficient management of ovarian cancer in Burkina Faso.

2. Patients and Methods

This was a retrospective study carried out in the cancer department of the Yalgado Ouedraogo University Hospital in Ouagadougou, capital of Burkina Faso. Patients with suspected ovarian cancer based on clinical, radiological and pathological evidence, between January 2017 and December 2022, were included. Medical records of these patients were analyzed. The variables of interest were related to the socio-demographic characteristics of patients, diagnostic and

therapeutic aspects of tumors. The modalities, indications and results of the imaging examinations they received were analyzed:

- 1) Frequency of imaging modalities used;
- 2) Frequency of imaging modalities performed as part of the preoperative assessment;
- 3) The quality of imaging reports;
- 4) Tumour characteristics:
 - a) Size: the largest axis measured in preoperative imaging
 - b) Location: uni or bilateral
 - c) Appearance: cystic, solid or mixed
 - d) The presence and site of secondary tumor locations.
 - e) The disease stage according to the FIGO 2018 classification [8].
- 5) For pre-operative CT, mention of criteria for non-resectability of ovarian cancers according to [9]:
 - a) Extra abdominal extension of the disease;
 - b) Presence of abdominal-pelvic metastasis;
 - c) Involvement of the back cavity of the epiploon and the hepatic hilum;
 - d) Retraction of the root of the mesentery;
 - e) The presence of suprarenal lumbo-aortic adenomegaly.
- 6) For preoperative ultrasound:
 - a) Mention of the route of realization of pelvic ultrasound
 - b) Mention of the descriptive elements on ultrasound according to the criteria for detecting benign or malignant ovarian tumours (table 1) [3]:
 - i. Uniocular or multilocular aspect;
 - ii. Aspect of the contours of the mass;
 - iii. Aspect of the tumor (mixed, tissue);
 - iv. Size and number of solid components;
 - v. Presence of an acoustic shadow;
 - vi. Tumor size;
 - vii. Presence or absence of ascites;
 - viii. Doppler vascularization.
 - c) The presence or not of a score according to the classification of Ovarian Adnexal Reporting and Data System (O-RADS), allowing to propose a risk of malignancy of the ovarian tumor. This classification is applied to pelvic ultrasound and MRI [10].

Table 1. Criteria for malignancy and benignity of ovarian lesions on ultrasound.

| Benign lesions | | Malignant lesions | |
|----------------|---|-------------------|--|
| Criteria | Description | Criteria | Description |
| B1 | Uniloculaire | M1 | Irregular solid mass |
| B2 | Largest solid component < 7 mm | M2 | Ascite |
| B3 | Acoustic shadow | M3 | At least four vegetations |
| B4 | Smooth-walled multilocular lesion < 100mm | M4 | Multilocular tumor with solid and irregular component and maximum diameter 100mm |
| B5 | No Power Doppler Flow | M5 | Intense Power Doppler Vascularization |

Data were collected and analyzed. Data collection permission obtained from the Yalgado Ouedraogo University

Hospital management. Anonymity and confidentiality of the data were respected.

3. Results

A total of 52 patient records that met the inclusion criteria were collected. The average age of the patients was 51.27 years with extremes of 18 and 86 years. Twenty-six patients (50%) came from cities or villages outside the capital.

Diagnostic and therapeutic aspects. The average consultation time was 9.7 months with extremes of 1 and 60 months. In 3 cases, the circumstances of discovery of the tumor were not mentioned. For the other cases, there was one case of accidental discovery during a systematic health check-up and two cases discovered during complications with acute intestinal obstruction. In other cases, the symptomatology noted was related to the increase in abdominal volume and pain in 32.6% of cases (n=16) and abdominal-pelvic pain in 20.4% of cases (n=10). Pain associated with transit disorders accounted for 12.2% of cases (n=6). Cancer Antigene (CA) 125 was performed in 30 cases (61.6%). It was high in 25 cases and normal in 5 cases.

Histopathological confirmation was obtained in 29 cases (55.8%), on the surgical gross specimen and by tissue biopsy

per-operative. Serous cystadenocarcinoma accounted for 60% of cases, followed by mucinous cystadenocarcinoma in 11.4%, granulosa tumors (2 cases) and mucinous cystadenoma of borderline malignancy (1 case). Analysis of ascites puncture fluid, performed in 6 cases, showed the presence of atypical cells suspected of malignancy.

Twenty-five patients were not operated on due to the presence of secondary lesions during the initial assessment. The most common sites of secondary lesions were lymph node (n=13), hepatic (n=12) and pleuropulmonary (n=7).

Twenty-seven patients underwent surgery: imaging suggested an ovarian tumour in 15 cases; in 10 cases, imaging described abdomino-pelvic masses of undetermined nature. It was mass labeled as uterine fibroma, tubo-ovarian abscess, adrenal mass and colic tumor. Excision of the ovarian tumour was only possible in 5 of these cases. In two cases, the surgical intervention occurred in an emergency context, in front of acute intestinal obstruction charts.

Socio-demographic, diagnostic and therapeutic characteristics are reported in Table 2.

Table 2. Socio-demographic, diagnostic and therapeutic characteristics of patients.

| Characteristics | Numbers | Percentages |
|--|---------|-------------|
| Socio-demographic characteristics (n=52) | | |
| Capital provenance | 26 | 50.0 |
| Other cities/villages | 26 | 50.0 |
| Circumstances of discovery (n=49) | | |
| Abdominal pain/volume increase | 16 | 32.6 |
| Isolated pains | 19 | 38.7 |
| Pain and digestive disorders | 17 | 34.7 |
| Abdominal volume increase | 5 | 10.2 |
| Abdominal mass | 5 | 10.2 |
| Digestive complication | 2 | 4.1 |
| Other | 4 | 8.1 |
| Chance discovery | 1 | 2.0 |
| Histopathology analysis (n=29) | | |
| Serous cystadenocarcinoma | 22 | - |
| Mucinous cystadenocarcinoma | 4 | - |
| Granulosa tumour | 2 | - |
| Cystadénome mucineux borderline | 1 | - |
| Cytopathological analysis (n=6) | | |
| Cellular atypia | 6 | - |
| Headquarters of secondary locations (n=24) | | |
| Lymph nodes | 13 | - |
| Liver | 12 | - |
| Pleura-Lung | 7 | - |
| Umbilicus | 3 | - |
| Pancreas | 2 | - |
| Os | 1 | - |
| Cutaneous plane | 1 | - |
| Colon | 1 | - |

Medical imaging check-up. The medical imaging explorations mentioned in patient records for the diagnosis and follow-up of ovarian tumors, were represented by CT in 94.2% (n=49) of cases, ultrasound in 57.7% of cases (n=30), standard radiography in 42.3% of cases (n=22) and MRI in eight cases.

The CT. It was performed as part of the preoperative assessment in 24 cases and in postoperative in 25 cases.

1) Pre-operative CT scan. Twenty-four CT scans were performed. Abdominopelvic floors were explored in 15 cases and thoraco-abdominopelvic in 9 cases. There were no standardized reports; the editorial style was

free. The mean tumour size was 107.8 mm with extremes of 30 mm and 230 mm. The appearance of the lesion (cystic, solid or mixed) was evoked in 14 cases (60.9%) and the enhancement of the tissue portions was missing in 4 cases (17%). The side of the mass was not specified in 1 case. The chest CT reports all mentioned the presence or absence of secondary tumors. The abdominal-pelvic CT reports all mentioned the presence or not of secondary tumors. There were no reports of whether or not the anterior cavity of the epiploons, the hepatic hilar plaque and the presence or absence of suprarenal lumbo-aortic adenomeia. The state of the

mesentery root was mentioned in two reports. Table 3 summarises the frequency of mention of the criteria for non-resectability of ovarian tumours in preoperative CT scan reports.

2) Post-operative CT scan. The 25 CT scans performed in the postoperative phase were prescribed for an extension assessment after surgery in 4 cases. In the other cases (n=21) these were CT scans performed for assessment and follow-up of tumors under chemotherapy. The reports were not standardized. There were no criteria for assessing tumor response mentioned.

Table 3. Frequency of mention of items of non-resectability of ovarian tumors on computed tomography in case of surgery of complete resection considered.

| Mention of items of non-resectability | AP CT (n=15) | | TDM TAP (n=9) | |
|---------------------------------------|--------------|--------|---------------|--------|
| | Present | Absent | Present | Absent |
| Extension extra abdominale | NA | NA | 9 | 0 |
| Pelvic abdominal metastasis | 15 | 0 | 9 | 0 |
| Hepatic hilum, anterior cavity | 0 | 15 | 0 | 9 |
| Presence of suprarenal aortic ADP | 0 | 15 | 0 | 9 |
| Root retraction of the mesentery | 1 | 14 | 1 | 8 |

AP CT: abdominopelvic CT. TAP CT: abdominopelvic CT; NA: Not applicable

The pelvic ultrasound. Twenty-seven patients underwent preoperative ultrasound. There were no reports of the use of the endovaginal route. The reports were not standardized. The editorial style was free. The characteristics of the following ovarian tumors were not mentioned in the ultrasound reports: the uni or multilocular nature of the cystic lesions, the size and number of the tissue buds, the presence of acoustic shadow and the contours of the mass. The average size of tumors on ultrasound was 107.09 mm, with extremes of 41 mm and 192 mm. The tumor component (cystic, tissue or mixed) was evoked in 80% (n=21) of cases. Ovarian localization was reported in 47% (n=12) of cases and extension to other pelvic organs in 20% (n=5) of cases. Vascularization of the lesion was mentioned in all cases. There was no record of an O-RADS classification. Table 4 summarizes the frequency of mention of the descriptive elements of ovarian tumors according to the recommendations of application of the «simple rules» of characterization of ovarian tumors.

Table 4. Frequency of mention of the descriptive elements of ovarian tumors according to the recommendations of application of the «simple rules» of characterization of ovarian tumors (n = 27).

| Characteristics | Present | Absent |
|---|---------|--------|
| Uni or multilocular appearance | 0 | 27 |
| Appearance of the contours of the mass | 0 | 27 |
| Appearance of the tumor (mixed, tissue) | 21 | 6 |
| Size and number of solid components | 0 | 27 |
| Acoustic shadow | 0 | 27 |
| Tumor size | 27 | 0 |
| Presence or absence of ascites | 27 | 0 |
| Doppler vascularization | 27 | 0 |

The chest x-ray. It was prescribed in one case as part of a respiratory symptomatology and in all other cases, in addition to an abdominal-pelvic ultrasound or CT scan, during the diagnosis or monitoring of ovarian tumors.

No pre-operative laparoscopy had been performed.

4. Discussion

Our study presented the difficulties related to the diagnosis of ovarian cancers in our context. These difficulties are multifactorial. They are related to the socio-economic conditions of patients, the characteristics of the disease, the technical facilities in medical imaging, and good practices in imaging.

Socio-economic conditions of patients. Burkina Faso is a country located in the heart of sub-Saharan Africa. There is a large social protection deficit characterized by the low capacity of individuals and households to cope with the consequences of unforeseen events (illness, job loss, natural disaster, etc.) [11]. There is still no universal health coverage for all. Patients must pay for their own examinations. Local people often rely on traditional medicine for their care.

The average cost of contrast-injected chest CT is 1.5 times the guaranteed minimum wage in Burkina Faso, while chest X-ray is about one-sixth. To reduce care expenses, radiography is sometimes prescribed instead of CT. As for abdominopelvic MRI, its average cost represents 3 to 4 times the guaranteed minimum wage, greatly limiting its accessibility to populations as noted in our study. In our study, the high cost of imaging had an influence on the diagnostic strategy of ovarian tumors. Indeed, chest radiography was often prescribed in addition to abdominal-pelvic CT, a less expensive strategy than performing a thoraco-abdominal-pelvic CT. This situation concerned 37.5% of CT scans performed.

Advanced stages to diagnosis. Ovarian cancers are often diagnosed at an advanced stage. This is due to the fact that there are no specific signs of ovarian cancer call. Indeed, present symptoms are often attributed to digestive disorders.

Only one case of ovarian tumor was discovered incidentally during a health check. In all other cases, digestive symptoms were noted. Abdominal pain and increased abdominal volume were the majority [6]. Long consultation times can also explain delays in diagnosis. They can be explained by the lack of financial resources, the geographical inaccessibility of health centers, the use of traditional treatments in first line, the errors of diagnosis, and the insufficiency of diagnostic capacities of peripheral health centers. Imaging these advanced stages is a challenge for the radiologist in that his conclusions are likely to significantly alter the therapeutic attitude. Indeed, because of the diagnostic delay, ovarian masses were often large. The original organ of the tumour can hardly be identified by imaging. Thus, pre-operative imaging had not evoked ovarian injury in 17 cases because of the volume of the tumor. The operated masses were considered uterine, colic or adrenal. The locoregional extension of tumors sometimes extended to the digestive tract, with complications such as intestinal obstruction. CT showed metastatic lesions in 24 cases, against indicating resection surgery.

The shortcomings of the technical platform in medical imaging. In our context, cross-section imaging is not available in all regions of the country. There was no functional MRI in the public sector. Only two MRIs were available in the country, within private structures in the capital. These explorations are therefore not often accessible for patients who mainly reside in the peripheral regions of Burkina Faso. The others modalities (ultrasound, CT, standard radiography) were the most available imaging exams.

CT and laparoscopy are recommended in the preoperative assessment of ovarian cancer [12]. They make it possible to define the therapeutic modalities: either a surgery of complete removal or a surgery after a neoadjuvant chemotherapy [13]. Coelioscopy was available in our context. It has the advantage of highlighting peritoneal involvement of small size, not visible on imaging during the preoperative assessment in addition to CT [13]. In our context, its indications are limited due to the advanced stages of the disease [3, 6, 9, 13, 14]. No operated patient could benefit from this technique in the preoperative assessment.

Shortcomings in good imaging practices. Pelvic ultrasound is the examination of first intention in the assessment of ovarian tumors. It should be performed suprapubically and endovaginally. The use of these two pathways allows a better characterization of ovarian lesions [15]. In our study, reports did not note the use of the endovaginal route. Also, the characterization elements of an ovarian tumor were inconsistent.

At CT, there are essential elements to specify to consider the resectability of ovarian tumors. These are the presence of supra-renal latero aortic adenomegaly, the appearance of the antechamber of the epiploons, the hepatic hilum and the root of the mesentery. Failure to mention all ovarian cancer extension sites may compromise the planning and quality of the planned full resection surgery. In our study, no reports

mentioned all these items.

The writing style of the reports was free, i.e., not standardized. This type of writing leads to omissions of certain elements that may be important for therapeutic decisions. The communication between the radiologist and his interlocutor is then under optimal [16]. The report, when it contains predefined sections to be completed, guarantees better communication with the correspondents. Adrieu et al [17] have compared case reports of ovarian tumors not resectable or difficult resectable. All the standardized reports mentioned all the criteria for non-resectability. But only 37% of the free reports mentioned them.

The chest was not constantly explored by CT. However, it is important to perform this examination in the preoperative assessment [15]. Only 37.5% of CT scans performed explored the chest during the initial assessment. Indeed, the presence of metastatic lesions changes the therapeutic protocol and the prognosis of the patient. However, the detection sensitivity of nodular and micronodular pulmonary lesions is lower on radiography. Below 2 cm, radiography sensitivity is 50% for solid nodules. It is even less sensitive to detect faint nodules [18].

There were diagnostic difficulties with imaging during monitoring and evaluation assessments. Criteria for assessing tumor response should be used for oncology patient monitoring [19]. In our study, none of the CT reports mentioned tumour evaluation criteria during follow-up. Imaging exams are often performed in different health centers. Protocols are not harmonized from follow-up to follow-up. There is little computerized archiving of data. Comparisons of examinations during evolutionary monitoring are therefore sometimes difficult.

5. Conclusion

The diagnostic challenges of ovarian cancer are numerous in our context of limited resources. There is certainly a diagnostic delay due to the often-late discovery of these tumors. But the challenge is to characterize the tumor and its extension in the most reliable way with the available scanning modalities, including ultrasound and CT. Radiologists should perform endovaginal pelvic ultrasonography in addition to the suprapubic tract to better explore the ovaries and characterize any suspect masses, using risk classifications for malignancy.

Imaging reports should be standardized, with an exhaustive semiological description according to international recommendations, for each type of assessment (resectability, assessment and monitoring of tumors), to optimize the management of these patients despite a context of limited resources.

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